

**Translation**

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>YY8194</b>	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. <b>PCT/JP2004/010194</b>	International filing date (day/month/year) <b>16.07.2004</b>	Priority date (day/month/year) <b>17.07.2003</b>
International Patent Classification (IPC) or national classification and IPC <b>H01M10/40, H01M4/02, H01M4/58</b>		
Applicant <b>UBE INDUSTRIES, LTD.</b>		

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>3</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>																									
<p>4. This report contains indications relating to the following items:</p> <table><tr><td><input checked="" type="checkbox"/></td><td>Box No. I</td><td>Basis of the report</td></tr><tr><td><input type="checkbox"/></td><td>Box No. II</td><td>Priority</td></tr><tr><td><input type="checkbox"/></td><td>Box No. III</td><td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td></tr><tr><td><input type="checkbox"/></td><td>Box No. IV</td><td>Lack of unity of invention</td></tr><tr><td><input checked="" type="checkbox"/></td><td>Box No. V</td><td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VI</td><td>Certain documents cited</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VII</td><td>Certain defects in the international application</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VIII</td><td>Certain observations on the international application</td></tr></table>		<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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Date of submission of the demand	Date of completion of this report																								
Name and mailing address of the IPEA/JP	Authorized officer																								
Facsimile No.	Telephone No.																								

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. I	Basis of the report
1.	<p>With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.</p> <p><input type="checkbox"/> This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:</p> <p><input type="checkbox"/> international search (Rule 12.3 and 23.1(b))</p> <p><input type="checkbox"/> publication of the international application (Rule 12.4)</p> <p><input type="checkbox"/> international preliminary examination (Rule 55.2 and/or 55.3)</p>
2.	<p>With regard to the elements of the international application, this report is based on (<i>replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report</i>):</p> <p><input type="checkbox"/> the international application as originally filed/furnished</p> <p><input checked="" type="checkbox"/> the description:</p> <p>pages <u>1-37</u> _____ as originally filed/furnished</p> <p>pages* _____ received by this Authority on _____</p> <p>pages* _____ received by this Authority on _____</p> <p><input checked="" type="checkbox"/> the claims:</p> <p>nos. <u>2-6, 8-13</u> _____ as originally filed/furnished</p> <p>nos.* _____ as amended (together with any statement) under Article 19</p> <p>nos.* <u>1-7</u> _____ received by this Authority on <u>17.05.2005</u></p> <p>nos.* _____ received by this Authority on _____</p> <p><input type="checkbox"/> the drawings:</p> <p>sheets _____ as originally filed/furnished</p> <p>sheets* _____ received by this Authority on _____</p> <p>sheets* _____ received by this Authority on _____</p> <p><input type="checkbox"/> a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.</p>
3.	<p><input type="checkbox"/> The amendments have resulted in the cancellation of:</p> <p><input type="checkbox"/> the description, pages _____</p> <p><input type="checkbox"/> the claims, nos. _____</p> <p><input type="checkbox"/> the drawings, sheets/figs _____</p> <p><input type="checkbox"/> the sequence listing (<i>specify</i>): _____</p> <p><input type="checkbox"/> any table(s) related to sequence listing (<i>specify</i>): _____</p>
4.	<p><input type="checkbox"/> This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).</p> <p><input type="checkbox"/> the description, pages _____</p> <p><input type="checkbox"/> the claims, nos. _____</p> <p><input type="checkbox"/> the drawings, sheets/figs _____</p> <p><input type="checkbox"/> the sequence listing (<i>specify</i>): _____</p> <p><input type="checkbox"/> any table(s) related to sequence listing (<i>specify</i>): _____</p>

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	8-9, 11-13	YES
	Claims	1-7, 10	NO
Inventive step (IS)	Claims		YES
	Claims	1-13	NO
Industrial applicability (IA)	Claims	1-13	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
Document 1: JP 2003-059529 A (Ube Industrial, Ltd.), 28 February 2003			
Document 2: JP 2000-195545 A (Ube Industrial, Ltd.), 14 July 2000			
Document 3: JP 2002-124297 A (Ube Industrial, Ltd.), 26 April 2002			
Document 4: JP 2003-142075 A (Matsushita Electric Industrial Co., Ltd.), 16 May 2003			
Document 5: JP 2003-187868 A (Hitachi-Maxell Ltd.), 4 July 2003			
Document 6: JP 2002-313415 A (GS Melcotec Co., Ltd.), 25 October 2002			
Document 7: JP 2002-117895 A (Matsushita Electric Industrial Co., Ltd.), 19 April 2002			
<p>Claims 1-7 and 10 are not novel and do not involve an inventive step in the light of document 1, cited in the international search report.</p> <p>Document 1, example 6, discloses a non-aqueous electrolyte solution for a lithium secondary battery, which contains vinylene carbonate 2 wt% and 2-propynyl methanesulphonate at 3 wt%, and a lithium secondary battery provided with said electrolyte solution and using</p>			

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

lithium cobaltate as the positive electrode active material and natural graphite as the negative electrode active material.

Claims 1-7 and 10 do not involve an inventive step in the light of document 1 and document 2 or 3, cited in the international search report.

Addition of an alkyne compound represented by formula (II)-(VI) in claim 1 in the present application to a non-aqueous electrolyte solution for a lithium secondary battery is a known technical means, as disclosed in documents 2 and 3. Therefore, a person skilled in the art could easily use an alkyne compound disclosed in document 2 or 3 instead of the alkyne compound 2-propynyl methanesulphonate disclosed in document 1.

Claims 8-9 do not involve an inventive step in the light of documents 1-3 and document 5 to 7, cited for the first time in the second written opinion.

Addition of a small quantity of an aromatic compound to a non-aqueous electrolyte solution in order to ensure safety of the battery in the event of overcharging is disclosed in documents 5 to 7, and is a technical means well known within the art. Therefore, a person skilled in the art could easily include a small quantity of such an aromatic compound in a non-aqueous electrolyte solution for a lithium secondary battery disclosed in document 1.

Claims 11-13 do not involve an inventive step in the light of document 4, cited in the international search report, with documents 1-3 and documents 5-7.

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Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

Document 4 discloses lithium secondary batteries provided with a negative electrode comprising a cathode mix layer with a density of 1.4-1.8 g/cm<sup>3</sup> formed on copper foil, a positive electrode comprising an anode mix layer with a density of 3.3-3.7 g/cm<sup>3</sup> formed on aluminium foil, and a non-aqueous electrolyte solution; and a person skilled in the art could easily adopt an electrolyte solution containing vinylene carbonate and an alkyne compound, disclosed in document 1, as the electrolyte solution.

Moreover, addition of an alkyne compound represented by formula (II)-(VI) in claim 1 in the present application to a non-aqueous electrolyte solution for a lithium secondary battery is a known technical means, as disclosed in documents 2 and 3, and addition of a small quantity of an aromatic compound to the non-aqueous electrolyte solution in order to ensure safety of the batter in the event of overcharging is disclosed in documents 5 to 7 and is a well known technical means. Therefore, a person skilled in the art could easily use an alkyne compound disclosed in document 2 or 3 instead of the alkyne compound 2-propynyl methanesulphonate disclosed in document 1, and include a small quantity of such an aromatic compound in a non-aqueous electrolyte solution for a lithium secondary battery disclosed in document 1.